HUC 05120106010010

DESIGN REPORT
INSPECTION PLAN
OPERATION AND MAINTENANCE PLAN
AND
POST CONSTRUCTION MONITORING PLAN

FOR THE

CROOKED LAKE ASSOCIATION, INC.

CROOKED LAKE ENHANCEMENT PROJECT

OCTOBER, 1995

J. F. NEW & ASSOCIATES, INC.
Environmental Engineers/Biologists/Planners/Consultants
Walkerton/Indianapolis,Indiana

***Revised 9-10-96 as per DNR Comments**

CROOKED LAKE ENHANCEMENT PROJECT
CROOKED LAKE ASSOCIATION, INC

INSPECTION PLAN
OPERATION AND MAINTENANCE PLAN
POST CONSTRUCTION MONITORING PLAN
AND
DESIGN REPORT

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

SECTION I

DESIGN REPORT

A. Location

Crooked Lake is located approximately 6 miles north of Columbia City, Whitley and Noble County, Indiana. The proposed lake enhancement project occurs near the headwaters of Little Crooked Lake and along Farm Ditch. Farm Ditch conveys the majority of flow for the Little Crooked Lake watershed. The entire drainage area for the Farm Ditch watershed covers approximately 161 acres.

The proposed lake enhancement project is located east and west of S.R. 9 and south of County Line Road. The site location can be found in the NW 1/4 of Section 2, Township 32N, Range 9E and NE 1/4 Section 3, Township 32N, Range 9E as found on the Merriam, Indiana Quadrangle Map.

B. Project Objective

The Crooked Lake Association, Inc. has proposed an enhancement system to improve the quality of water entering Crooked Lake. The land use present for the contributing watershed is primarily agricultural. The main uses of the agricultural area is row crops and set-aside. The profile of Farm Ditch has a significant grade until the IDNR Nature Preserve, where it flattens and starts meandering down to the discharge into Little Crooked Lake. The system, consisting of constructing an earthen embankment to create a constructed wetland/sedimentation basin and erosion control measures along Farm Ditch, is necessary to reduce the amount of nutrient and sediment loading occurring in the lake.

The concept behind retaining water in a constructed wetland/ sedimentation basin or the use of other hydraulic control structures is to reduce the suspension and transportation energy of moving waters. Water in motion has the capacity to scour and transport fine sediments (silts and clays) long distances before deposition. While a basin that has an inflow and an outflow cannot hold water motionless, the energy can be reduced sufficiently to facilitate the fallout of sediment from the water column. the erosion control measures along Farm Ditch should prevent further bank erosion.

Additionally, the constructed wetlands will remove nutrients from the runoff through uptake by the wetland plant species and the bacteria they support.

The following factors were considered for optimal hydraulic control structure/sedimentation basin and/or constructed wetland design.

- Significantly reduce the horizontal velocity of the water column.
- Reduce velocities of the inflow water as it enters the basins. Encourage sheet flow,

rather than turbulent, channelized flow.

- Encourage the uniform distribution of flow throughout the entire volume of the constructed wetland basin.

- Maximize contact of water with the substrate and vegetation in the wetland systems to facilitate efficient nutrient uptake.

- Store as much water as possible, for as long as possible, from the largest feasible storm event.

- Structural stability and longevity. Resistance to hydraulic stress and , erosive scour.

- Reduction of operation and maintenance costs.

- Maximize safety of the system operation, maintenance and monitoring personnel and the general public.

- Optimizing the sites for wildlife habitat suitability, if within construction budget.

- Minimize construction costs.

C. General Project Description

The project involves constructing an earthen berm near the head of the watershed in order to contain surface flow prior to entering Farm Ditch. The berm will create 0.5 acres of deeper water for submergent vegetation and 1.9 acres of wetlands with emergent vegetation. The impounded area will function as a sedimentation basin and as a wetland area for the removal of nutrients.

Another part of the project is the stabilization of eroding banks at the upstream portion of Farm Ditch. Starting from the Highway 9 culvert and continuing 400 feet downstream, the side slopes of will be pulled back from 1:1 (horizontal:vertical) to 2:1 slopes. The slopes will be protected and re-vegetated using erosion control blankets and plant plugs.

A one (1) foot gabion drop structure will be placed approximately 415 feet downstream from the Highway 9 culvert. Farm Ditch has a steep grade and the drop structure will be used to reduce velocity and associated erosive forces.

The final part of the project involves the outlet of an existing pond, which Farm Ditch runs through. The channel downstream of the pond is experiencing severe erosion and washout. The outlet will be stabilized with gabion baskets along the channel and side slopes. A series of gabion drop structures will be placed downstream of the outlet to reduce the velocity of water flowing in the channel. A rip rap point bar will be placed down stream of the outlet to deflect the water away from vertical slopes. The vertical slopes will be treated by using the removed timber from slope regrading and tied-back in order to protect the toe of slope.

Erosion control blankets and rip rap will be used throughout the washout area to protect the highly erodible slopes.

D. Hydrology and Hydraulics

1. Watershed Modeling

Technical Release No. 55 (TR-55) was developed by the United States Soil Conservation Service (SCS) for modeling small watersheds. TR-55 provides user-friendly procedures to derive practical solutions for hydrology problems, such as calculations of peak discharge, hydrograph generation, reach routing, and detention storage estimates. The hydrologic methods were based on a 24 hour storm event and SCS Type II rainfall distribution.

The Tabular Hydrograph Method was used to develop hydrographs for the Farm Ditch watershed. This method is most applicable based on the non-homogeneous areas of the watershed, which were broken up into three subareas. Each subarea took into account difference in ground cover, types of flow, slope of channel, time of concentration, reach routing times and drainage area.

Appendix A gives the results of the peak discharges of multiple events for the three subareas.

2. Hydraulic Model

The U.S. Army Corps of Engineers HEC-2 Water Surface Profile computer program was used to determine the uniform flow depth, also known as normal depth, and channel velocity for Farm Ditch. The computational procedure is based on the solution of the one-dimensional energy equation with energy loss due to friction evaluated with Mannings equation. The computational procedure is commonly referred to as the Standard Step Method.

The study reach began approximately 1000 feet downstream of Highway 9 and continued upstream to approximately 50 downstream of Highway 9. The starting water surface elevation was calculated by the HEC-2 program using the slope-area method. The cross sections were developed from 10 foot topography of the site. Additionally, full valley cross sections of Farm Ditch were surveyed and used in creating the flood model. The design discharge was determined from the Soil Conservation Service Technical Release 55 hydrologic model.

The uniform flow depth and channel velocities were computed for existing conditions. **Appendix B** summarizes these findings.

E. Structural Stability Analysis

1. Earthen Embankment

The design of the earthen embankment was based upon the results of a subsurface investigation report, which is provided in **Appendix C**.

The embankment was designed with 3:1 side slopes as recommended in the SCS Technical Field Guide for earthen berms. The top width of the embankment has been set at 10 feet to allow for easier construction equipment access. The embankment will be stabilized with appropriate vegetation. The vegetation will anchor into the berm and hold the soil in place.

2. Streambank Stability Analysis

a. Theory of Sediment Supply

The theory of sediment supply states that the amount of material transported, eroded or deposited in an alluvial channel is a function of the sediment supply and channel transport capacity. The transport capacity is a function of the size of the sediment, the discharge in the stream and the geometric and hydraulic properties of the channel. The Lane relationship states that equilibrium exists when transport capacity equals sediment supply. The increase in volume of water due to development has offset the balance, causing the stream to continually adjust in order to reach a point of equilibrium.

When the sediment supply is greater than the sediment transport capacity, the material is deposited in the stream and agredation occurs. This occurs downstream of the erosion when the stream is carrying more sediments than it can handle and deposits the material in the areas where point bars have formed.

When the sediment transport capacity exceeds the sediment supply, then erosion or degradation occurs. This happens once the sediment has been deposited and more sediment is needed to reach equilibrium. The stream finds this material by scouring away at the face of unstabilized banks or stream bottoms.

b. Theory of Stability

The principal method for determining the stability of stream banks is comparing the permissible shear stress of the material present on the banks to the maximum shear stress occurring in the stream for a certain rain event. The Tractive Force Theory is the most widely accepted method for determining the maximum shear stress. The dynamic force of water being transported in a channel is known as tractive force. As stated by the Federal Highway Administration, the basis for stable channel design is that flow-induced tractive force should not exceed the permissible or critical shear stress of the channel lining material. The formula for maximum shear stress is as

follows:

$$T_d = 62.4\ d\ S$$

where d is maximum depth of flow for a given storm event and S is the channel slope.

The flow around a bend creates alternate currents, which apply higher shear stresses on the channel sides and bottom compared to straight channels. The shear stress at a bend is equal to:

$$T_b = K_b\ T_d$$

where K_b is the ratio of channel curvature to bottom width.

c. Design Parameters for Determining Stability

The design discharge for a 5 year storm event was determined to be 35 cfs. The 5 year event was established as a design parameter because it has a high probability of occurring within the first year of establishing vegetation as compared to larger events. Designing for the 5 year storm will provide adequate protection for the banks until vegetation is established. The drainage area was measured to be approximately 101 acres. The maximum flow depth, as determined from the HEC-2 hydraulic computer model, was 2.3 feet.

d. Slope Protection

Several permanent and temporary lining were examined for protecting the channel. The temporary blanket North American Green SC150 was selected however, an equivalent product may be used. The blanket features a 70% straw, 30% coconut fiber matrix. The tested permissible shear stress was 1.80 psf.

The calculated 5 year discharge for this stream does not indicate that Farm Ditch has a high discharge. According to the specification guide, this blanket was developed for medium flow channels and applications requiring extended protection during vegetation establishment. The SC150 does not provide the permanent protection, but is sufficient for protecting the banks during a 5 year storm event until bank vegetation is established. Another advantage of using SC150 is that the blanket will bio-degrade.

See **Appendix D** for design calculations regarding slope stability.

e. Conclusions

The use of stable channel design shows that the existing conditions do not provide enough protection from the tractive forces. The proposed side slopes of 2:1 and use of streambank blanket SC150 along the channel section creates an area where the actual shear stress is less than the permissible shear stress. Therefore, the newly

constructed streambanks will be more stable than the current conditions.

F. Environmental Concerns

1. Wetlands

There are no jurisdictional wetlands within the project limits.

2. Threatened or Endangered Species

According to the Indiana Department of Natural Resources, no threatened or endangered species of plants or animals are known to exist in the proposed project locations.

A letter was sent out to which the Indiana Department of Natural Resources has 30 days to respond regarding threatened or endangered species. The lack of a response was indication of no known threatened or endangered species of plants or animals in the proposed project locations.

3. Operations and Maintenance Activities

There are no foreseeable future operation and maintenance activities that should cause any environmental impacts on Farm Ditch or Crooked Lake.

G. Land Rights

The type of property rights acquisitions for the construction or long term operation of the designed structures, whether as easements, lease arrangements or outright purchases, has not been determined by the Crooked Lake Association, Inc. This summary will need to be revised once final property acquisition has been completed.

H. Special Items/Materials Required

The only item that could be considered special would be the in-line water level control structure located in the earthen embankment. Should the stop logs which control the water level in the embankment become damaged or lost they could be replaced with easily available materials

I. 0 & M Considerations That Have Affected Design

1. Hydraulic Control Structure

The were several options available to control the water level behind the earthen embankment. The selected alternative provides the greatest operational flexibility and the lowest capital and maintenance costs. See **Table No. I-1** for cost estimates.

J. Engineer's Estimated Costs For The Project Construction Phase

The following **Table No. I - 1** provides cost estimates for both the construction portion and the engineering and inspection services to be provided during the project construction phase.

TABLE NO. I-1
CONSTRUCTION PHASE COST ESTIMATES

Item/Task	No. of Units	Cost/Unit	Total Costs
A. Constructed Wetland/ Sediment Control Basin			
1. Earthwork	1,846 CY	$ 6.00 /CY	$11,076
2. Hydr. Contr. Str.	1 EA	$ 2,500 /EA	$ 2,500
3. Rip Rap	81 CY	$ 32.00 /CY	$ 2,592
4. 21" CMP	90 LF	$ 30.00 /LF	$ 2,700
5. Pipe Access.	1 LS	$ 1,200 /LS	$ 1,200
6. Erosion Control	1 LS	$ 500 /LS	$ 500
7. Seeding/Planting	1 LS	$ 2,000 /LS	$ 2,000
8. Mobilization	1 LS	$ 4,000 /LS	$ 4,000
SUBTOTAL			**$26,568**
B. Stream Bank Stabilization			
1. Earthwork	174 CY	$ 6.00 /CY	$ 1,044
2. Filter Fabric	676 SF	$ 2.50 /SF	$ 1,690
3. Gabions - 1' D	44 SY	$ 42.00 /SY	$ 1,848
4. Gabions - 3' D	9 SY	$100.00 /SY	$ 900
5. Rip Rap	45 CY	$ 32.00 /CY	$ 1,440
6. E.C.B. - SC150	1,690 SY	$ 1.50 /SY	$ 2,535
7. Erosion Control	1 LS	$ 500 /LS	$ 500
8. Seeding/Planting	1 LS	$ 1,500 /LS	$ 1,500
9. Mobilization	1 LS	$ 2,000 /LS	$ 2,000
SUBTOTAL			**$13,457**
C. Barkey Pond Area			
1. Special Fill	21 CY	$ 20.00 /CY	$ 441
2. Filter Fabric	1,129 SF	$ 2.50 /SF	$ 2,822
3. Gabions - 1.5' D	27 SY	$ 56.00 /SY	$ 1,512

4. Gabions - 3' D	26 SY	$100.00 /SY	$ 2,600
5. Rip Rap	51 CY	$ 32.00 /CY	$ 1,632
6. E.C.B. - P300	24 SY	$ 5.00 /SY	$ 120
7. Erosion Control	1 LS	$ 1,500 /LS	$ 1,500
8. Seeding/Planting	1 LS	$ 500 /LS	$ 500
9. Mobilization	1 LS	$ 2,000 /LS	$ 2,000
SUBTOTAL			**$13,127**
TOTAL CONSTRUCTION COSTS			**$53,152**
14. Construction Engineering			$ 4,000
15. Inspection (part-time - 20 days)			$ 8,000
16. Administration			$ 3,000
TOTAL CONSTRUCTION PHASE COSTS			**$68,152**

SECTION II

INSPECTION PLAN

A. Overall Description of Project

1. Description

Crooked Lake is located approximately 6 miles north of Columbia City, Whitley and Noble County, Indiana. The proposed lake enhancement project occurs near the headwaters of Little Crooked Lake and along Farm Ditch. Farm Ditch conveys the majority of flow for the Little Crooked Lake watershed. The entire drainage area for the Farm Ditch watershed covers approximately 161 acres. The present land use for the contributing watershed is primarily agricultural. The main uses of the agricultural area is row crops and set-aside. The profile of Farm Ditch has a significant grade until the IDNR Nature Preserve, where it flattens and starts meandering down to the discharge into Little Crooked Lake.

The project involves constructing an earthen berm near the head of the watershed in order to contain surface flow prior to entering Farm Ditch. The berm will create 0.9 acres of deeper water for submergent vegetation and 1.9 acres of wetlands with emergent vegetation. The impounded area will function as a sedimentation basin and as a wetland area for the removal of nutrients.

Another part of the project is the stabilization of eroding banks at the upstream portion of Farm Ditch. Starting from the Highway 9 culvert and continuing 400 feet downstream, the side slopes of will be pulled back from 1:1 to 2:1 slopes. The slopes will be protected and re-vegetated using erosion control blankets and plant plugs.

A one (1) foot gabion drop structure will be placed approximately 415 feet downstream from the Highway 9 culvert. Farm Ditch has a steep grade and the drop structure will be used to reduce velocity and associated erosive forces.

The final part of the project involves the outlet of an existing pond, which Farm Ditch runs through. The channel downstream of the pond is experiencing severe erosion and washout. The outlet will be stabilized with gabion baskets along the channel and side slopes. A series of gabion drop structures will be placed downstream of the outlet to reduce the velocity of water flowing in the channel. A rip rap point bar will be placed down stream of the outlet to deflect the water away from vertical slopes. The vertical slopes will be treated by using the removed timber from slope regrading and tied-back in order to protect the toe of slope. Erosion control blankets and rip rap will be used throughout the washout area to protect the highly erodible slopes.

2. Authority and Duties of the Inspector

The authority and duties of the Inspector, also known as the Resident Project Representative, is clearly defined in Article 9.13 of the General Conditions and the Supplementary Conditions in the Contractor's Project Manual (also known as the Specifications).

B. Items of Work to be Inspected

The overall responsibility of the Inspector is to ensure the Contractor complies with the requirements of the project plans and specifications (Contract Documents). Specifically, that the materials furnished and the work installed meet the intent project plans and specifications.

The primary items of work to be inspected include the following items:

1. Earthen Berm Construction

- Verify Contractor's layout of the toe of slopes is correct.
- Ensure Contractor provides the specified compaction testing as the berm is being constructed.
- Verify that the Contractor is following proper erosion control procedures during construction of the berm.
- Confirm that the berm is properly seeded after construction.
- Verify that the water level control structure has been installed plumb and the correct elevation.
- Verify that the earthen berm piping is installed at the correct slope and at the correct inverts.
- Verify the Contractor is conducting soil density testing in accordance with the requirements listed in the Project Manual.

2. Rip Rap and Gabions

- The gabions and rip rap are the proper material and are installed were shown on the plans and in accordance with the plans and specifications.

3. Erosion Control

- Temporary and final erosion control measures as required by Specification Section 02250.
- Filter fabric and erosion control blankets are installed where shown on the Plans.
- All areas disturbed by construction activities have been planted in accordance with Specification Sections 02820 through 02880.

4. Other Items

- If damaged, all road surfaces used for equipment and machinery access are restored to original condition.
- Prior to final completion, the Contractor has adequately cleaned up the construction site in accordance with Specification Section 01720.

The inspection of the above items may be on an intermittent basis. However, the Lake Association may want portions of the earthen berm construction and the installation of the water level control structure and associated piping inspected on a continuous basis to insure compliance with the contract documents.

C. Project Layout and Staking

The Contractor, not the inspector, is responsible for the correct layout and staking of the project. However, the following information is provided to the inspector for guidance and advice in the event the contractor should need it.

1. Horizontal and Vertical Layouts East of S.R. 9

Both the horizontal and vertical positions of the structures located east of S.R. 9 are based on a temporary bench mark located on the first power pole east of S.R. 9 and north of County Line Road. The elevation of this benchmark is 963.23 M.S.L.

2. Horizontal Layouts West of S.R. 9

All structures west of S.R. 9 are horizontally stationed from the centerline of S.R. 9

3. Vertical Layouts West of S.R. 9

All structures west of S.R. 9 are vertically located from a permanent bench mark which is a brass tablet (#G-196) located on the east side of S.R. 9 at the culvert crossing. The elevation of this benchmark is 945.45 M.S.L.

D. Maintenance and Development of Record Drawing

It is the responsibility of the Contractor to develop and maintain Record ("As-Built") drawings for the project. However, the inspector should maintain his own set in clear readable order on the project site for the inspection by any interested party.

In accordance with specification Section 01720. The Contractor shall keep one (1) copy of all project specifications, plans, addenda, modifications, supplemental drawings, shop drawings and change orders at the project site in good order and annotated to show all changes made during the construction process. In addition, the Contractor shall develop three (3) sets of "as-builts" for the project.

The record drawings shall show all final elevations and dimensions, sizes and depths for buried sheets, members, structures, and all other information as necessary to constitute as-built records. These documents shall be kept daily by the Contractor and be made available to the Inspector and routinely checked by the Inspector for completeness and accuracy based on the Inspector's daily records and notes. It will be the Contractor's responsibility to furnish any and all information lost due to the Inspector's loss of these record drawings and vis-a-vis. In addition to other Contract requirements, retainage will be partially based on the Contractor's and Inspector's ability to maintain good as-built records, as determined by the Owner. Upon completion of the project these record "as-built" drawings together with any other annotated supplemental plans, drawings, sketches, etc. shall be delivered to the Owner for his final review and approval. If approved, the documents will be delivered to the Engineer for the Owner's record. If disapproved, they will be returned to the Contractor for corrections, as necessary.

E. List of Inspector's Equipment

All persons providing construction inspection services shall have available the following minimum list of equipment:

- Fiberglass or steel measuring tape (25').
- Notebook and/or daily inspection forms for recording Contractor's activities and progress. See **Appendix E**.
- Hand-held calculator.
- A two foot (minimum) level.
- Two (2) sets of Plans and Specifications - one set designated for recording as-built information.
- Access to a surveying level, tripod, and measurement rod in good working condition. Typically this can be supplied by the Contractor.

F. Recommended Qualifications of Inspectors

The inspector shall have the following minimum qualifications:

- Previous experience in inspecting civil engineering projects, in particular, the construction of soil embankments.
- Experience in the establishment of vertical and horizontal control or access to a qualified surveyor.
- Experience in the inspection and/or installation of erosion control materials.
- Above all, the Inspector must be completely familiar with the requirements of the Contract Documents.

SECTION III

OPERATION AND MAINTENANCE PLAN

A. Description of Operational Procedures and Maintenance Activities

The following are recommended methods and strategies for operating and maintaining the hydraulic control structures and the constructed wetland/sediment control basin designed for the lake enhancement project. The hydraulic control structures impound water to slow velocities to help reduce erosion. The constructed wetland/sediment control basin has been designed to require minimum operator attention and minimize long term maintenance.

1. Operational Procedures

The only operational procedure associated with this project is the ability to control the depth of water in the constructed wetland/sediment control basin. By adding and removing PVC "stop logs" in the structure the depth of water in the constructed wetland/sediment control basin can be raised or lowered.

2. Maintenance Activities

The primary maintenance activity to be performed is the inspection of the structural integrity of the constructed wetland/sediment control basin earthen embankment, the Barkey Pond earthen embankment, the water level control structure, rip rap and erosion control measures.

There are two locations along the project where sediment can accumulate. the first is the constructed wetland/sediment control basin formed by the earthen embankment at the eastern end of the project. The second location is Barkey Pond which is located west of S.R. 9. However, due to the work involved with the project which is to reduce the bank erosion along Farm Ditch and the depths of the basins, it is believed that the basins will not substantially fill (> than 50% loss of capacity) during the foreseeable life of the project.

However, this should be confirmed by periodic sampling of Farm Ditch (See **Section IV**) immediately after rain events.

B. Projected Maintenance Schedule

1. Inspection of the Earthen Embankment

The western slopes of the earthen embankments should be inspected on a quarterly basis to verify that there is no seepage coming through the embankments. This is especially important during wet weather in the Spring. Additionally, inspections should verify that there is no slope erosion of the embankment.

2. Inspection of Rip-rap and Erosion Control Measures

All exposed rip-rap should be inspected for stability on an annual basis. Any riprap that is misplaced or that has been moved should be replaced (if possible with heavier stones). Where erosion has occurred, protective measures should be installed to protect from further erosion.

C. Estimated 0 & M Costs Per Year

Annual operation and maintenance costs should be minimal, if there are any costs at all. If the inspections can be performed by volunteers then annual operation and maintenance costs should not be incurred. However, it is recommended that the Lake Association establish an account of $5,000 to $10,000 that would be available for potential repairs to the erosion control measures or water level control structure.

SECTION IV

POST CONSTRUCTION MONITORING PLAN

A. General

The post construction monitoring program for the Crooked Lake Enhancement Project involves monitoring the effectiveness of the constructed wetland/sedimentation basin, Barkey Pond and the erosion control measures.

The post construction monitoring program should be integrated with the operation and maintenance activities discussed in **Section III.**

The following monitoring plan centers on monitoring the effectiveness of the constructed wetland/sediment basin in removing sediments and the nutrient phosphorus and the effectiveness of the erosion control measures in reducing bank erosion along Farm Ditch. Phosphorous is normally the limiting nutrient in aquatic systems. A secondary component of the monitoring plan is to inspect the earthen embankment and erosion control measures and monitor the succession of the wetland system.

A plan to monitor the success of lake enhancement projects must contain four key elements:

1) Qualified personnel to perform the monitoring;

2) Clearly defined monitoring objectives with a specific set of monitoring parameters;

3) A monitoring schedule;

4) A reporting format.

B. Qualified Personnel

Personnel monitoring the success of the wetlands and sedimentation basins after construction is complete should have the following qualifications:

- General knowledge of wetlands, and wetland ecological functions.
- Familiarity with the design objectives to be achieved by the constructed wetlands and sedimentation basin.
- Familiarity with identification of wetland plant species, herbaceous vegetation, shrubs and trees.
- General familiarity with the watershed and soil types.

Persons qualified to perform part or all of the monitoring may include:

- Professional environmental scientists such as the staff of J. F. New and Associates, Inc.

- Whitley County SWCD staff.

C. Monitoring Objectives And Recommended Inspection Parameters

The purpose of this monitoring program is to verify that the constructed wetland/ sedimentation basin is performing the water quality improvement functions it was designed to provide. Additionally, the program should verify that the erosion control measures are reducing bank erosion along Farm Ditch. In order to monitor the effectiveness a set of monitoring parameters must be defined. In general the monitoring would involve visual inspection and chemical testing.

1. Visual Inspection

The visual inspection component of the monitoring program will involve three major components.

a. Inspection of the structural integrity of the earthen berm, water level control structure and erosion control measures (See **Section III**).

b. Inspection and assessment of the vegetative community in the constructed wetland/sedimentation basin.

c. Determination of the siltation rate in Farm Ditch during rainfall events.

For the earthen embankment, water level control structure and erosion control measures a visual inspection of the **structural integrity** will be necessary. The project area will need to be inspected for the following:

- Human activity and vandalism, such as riding horses and off-road vehicles on the embankment, destruction of the water level control structure and outlet structure, etc.
- Animal activity, such as groundhog, beaver or muskrat burrowing.
- Erosion.
- Tampering with the stop logs on the water level control structures.

Prompt reporting to Whitley County Sheriff or conservation law enforcement personnel of any illegal activity impairing the performance or integrity of the project area.

The constructed wetland will need to be inspected to **assess the vegetative community** which is an important indicator of its health and therefore its efficiency

in removing nutrients. Inspections should include the identification and quantification of the following plant classifications:

- Wetland plant species
- herbaceous cover
- shrubs (woody plants less than 4" diameter)
- trees

As the constructed wetland system matures, a succession of the vegetation community is expected.

Both quantitative and qualitative information must be recorded to measure the maturation of the constructed wetland. A site map from the project plans of the project can be used as a base map for recording the location and quantities of the vegetative communities. A photographic record can be extremely valuable for documenting the progression of the wetlands development.

Finally, both the sedimentation basin/constructed wetland and Barkey Pond should be monitored to **determine the amount of silt build up**. The depth of water during normal flow can be determined and compared to previous measurements using a simple measuring stick. The depth of new silt should approximately be the difference between the depths of water. The depth of silt in each structure should be recorded to assess the rate of silt accumulation.

2. Chemical Testing:

The following tests should be conducted to determine the performance of the constructed wetlands and sedimentation basins.

- Total Phosphorus (TP)
- Total Suspended Solids (TSS)

Many other parameters may be routinely measured in monitoring programs where ample funding and expertise are available. Most of these parameters are measured for reasons more academic than utilitarian. The 1988 EPA Lake and Reservoir Restoration Guidance Manual has a section on post monitoring of lake restoration projects. It is suitable for monitoring overall lake water quality improvement resulting from implementation of restoration practices. The Guidance Manual contains a table listing a sampling protocol for overall lake monitoring. If information on additional parameters are deemed necessary, J. F. New and Associates, Inc. staff are available to work with the Lake Association to redefine monitoring objectives and professionally perform or supervise the monitoring activities.

D. Monitoring Schedule and Sampling Locations

The monitoring should be performed on a seasonal basis, with consideration given to interpreting the results of the chemical parameters. In different seasons, natural surface

waters are expected to exhibit different chemical characteristics. This should be kept in mind when results are being analyzed. Therefore, results should not be compared between different seasons.

Visual inspection of the structural integrity of the project site should occur on a routine basis and as often as possible.

Growth of dominant vegetation should be well established by July. Therefore, the assessment of the vegetative community of the constructed wetland should occur during this month.

Chemical samples should be taken at the inflow points to the constructed wetland/sedimentation basin, immediately ahead of Barkey Pond and the end of the project beyond the "washout area" at the IDNR Nature Preserve. The sample should be taken from well mixed water at each location.

Following is the recommended annual monitoring schedule and the parameters to monitor:

TABLE IV-1
MONITORING SCHEDULE

Monitoring Parameter	Spring (April)	Summer (July)	Fall/Winter (Nov.-Feb.)
Vegetation Mapping		x	
Structural Inspection	x	x	x
Total Phosphorus	x	x	x
Total Suspended Solids	x	x	x

The monitoring program should be implemented as soon as the constructed wetland/sedimentation basin is filled to capacity and fully operational.

While the wetlands are expected to begin performing their intended purpose immediately, in-lake recycling of nutrients from main lake sediments will keep the phosphorus levels in the main lake water column high for several years to come.

E. Sample Collection/Analysis

Within 24 hours of the end of approximately a one and one half (1 1/2) inch rain event, samples should be collected at the location discussed above.

A laboratory, such as Environmental Monitor Services in Indianapolis (phone (317) 253-2439) or Envirocorp in South Bend (phone (219) 287-2282), can be contracted to perform

the analytical chemistry services. The laboratory chosen for the analytical chemistry will typically supply sample containers for the collection and storage of water samples.

Water can be analyzed for TP and TSS at relatively reasonable rates. For example TP samples analyzed to detection limits of one tenth of a part per billion (. 1 ug/1) are usually performed for $28 per sample. Total Suspended Solids (TSS), measured in parts per million, can be analyzed at $14 per sample. Therefore, the annual cost for laboratory testing would be approximately $550, including sample shipping costs.

F. Reporting Format

The reporting of field measurements and observations should be done on standard forms (See **Appendix F**) made up by the person designated responsible for the monitoring and reporting of results. Care should be taken so that data from monitoring the constructed wetlands effectiveness can be used in a comparison to overall lake water quality postmonitoring results.

All field data sheets should be copied and stored in a three ring binder for annual compilation and analysis. Results of each monitoring should be tabulated so that comparisons between monitoring inspections are presented in only a few tables.

Results from the testing labs also need to be tabulated and included as part of the reporting format.

APPENDIX A

APPENDIX A

PEAK DISCHARGE RATES

	Peak Discharge (cfs)				
	Return Years				
Subareas	1	5	10	50	100
#1	6	22	31	68	85
#2	14	44	64	141	157
#3	14	50	72	165	186

APPENDIX B

APPENDIX B

CHANNEL DEPTHS AND VELOCITIES

Stream Station (feet)	Location	Existing 5-Year Flood Elevation (feet)	Existing 5-Year Channel Velocity (ft/s)
19+50	Beginning of study	934.53	2.23
18+00		935.08	2.16
16+00	600 feet D/S of Hwy 9	935.75	2.19
14+00		936.79	3.22
12+00		938.06	2.37
10+75	50 feet D/S of Hwy 9	938.78	3.33

APPENDIX C

Alt & Witzig Engineering, Inc.
3725 Foundation Court, Suite A • South Bend, Indiana 46628
(219) 289-8378 • Fax (219) 289-0282

April 21, 1995

J.F. New & Associates, Inc.
708 Roosevelt Road
Walkerton, In 46574
ATTN: Ms. Gina Weilbaker

RE: Subsurface Investigation
Proposed Retention Berm
Crooked Lake Project
Columbia City, Indiana
Alt & Witzig Project No. S5727

Dear Ms. Weilbaker:

In compliance with your request, we have completed a subsurface investigation and evaluation for the above referenced project. It is our pleasure to transmit herewith two copies of our report.

The purpose of this subsurface investigation was to determine the various soils profile components and the engineering characteristics of the materials encountered.

Site Location

This site is located on S.R. 9 north of Columbia City, Indiana. Specifically, the site is located in the field which comprises the southeast quadrant of the intersection of S.R. 9 and County Line Road.

Field Services

The field investigation included a reconnaissance of the project site, taking soil borings as shown on the attached boring location plan, performing standard penetration tests, and obtaining soil samples retained in the standard split-spoon sampler. The soil borings were performed with a conventional drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes.

Representative samples were obtained employing split-spoon sampling procedures in accordance with ASTM Procedure D-1586.

During the sampling procedure, standard penetration tests were performed at continuous intervals to obtain the standard penetration value of the soil. The standard penetration value is defined as the number of blows of a 140-pound hammer, falling 30 inches, required to advance the split-spoon sampler one foot into the soil. The results of the standard penetration tests indicate the relative density and comparative consistency of the soils, and thereby, provide a basis for estimating the relative strength and compressibility of the soil profile components.

Laboratory Testing

The types of soils encountered in the borings were visually classified and are described in detail on the boring logs, which are attached. Representative samples of the soils encountered in the field were placed in sample jars and are now stored in our laboratory. Unless notified to the contrary, all samples will be disposed of after three months.

The laboratory testing program included unconfined compression tests of cohesive soil samples by use of a calibrated spring testing machine. In addition, a calibrated soil penetrometer was used in determining the strength of the soil. The values of the unconfined compressive strength must be considered approximations only, since the split-spoon sampling technique provides a representative, but somewhat disturbed, soil sample. Moisture content tests on representative cohesive soil samples were also taken.

Subsurface Conditions

The test borings typically encountered a stiff to very stiff clayey silt from beneath the topsoil to the termination depth of the borings (corresponding to fourteen (14) feet below grade). This cohesive soil has relatively high strength characteristics and low permeability and should be excellent material for the berm foundation as well as the berm construction itself. Unconfined compressive strength tests results were on the order of 5,000 psf or greater and permeability of the soil is estimated to be on the order of 10^{-5} to 10^{-6} cm/sec. It will be necessary to strips at least six (6) inches of topsoil when constructing the berm.

In the location of boring B-1, some brick fragments were detected in the two (2) to three and one-half (3-1/2) foot sample from the split spoon sampler. This could be fragments of a field drain tile or miscellaneous debris. If fill material is detected after stripping, it should be removed and replaced with compacted fill.

Please call in there are any further soil parameters you require for this project. Often, because of design and construction details which occur on a project, questions rise concerning the soil conditions. If we can give further service in these matters, please call.

Very truly yours,

ALT & WITZIG ENGINEERING, INC.

Paul D. Coats

PDC/TJC:se

Paul D. Coats,
Project Engineer

Thomas J. Coffey

Thomas J. Coffey, P.E.

Alt & Witzig Engineering, Inc.
3405 W. 96th Street • Indianapolis, Indiana 46268
(317) 875-7000 • Fax (317) 876-3705

October 4, 1995

J.F. New & Associates, Inc.
708 Roosevelt Road
P.O. Box 243
Walkerton, Indiana 46574
ATTN: Ms. Gina Weilbaker

RE: Subsurface Investigation & Recommendations
Existing Crooked Lake Dam Evaluation
Whitley County, Indiana
Alt & Witzig File: S5413

Gentlemen:

In compliance with your request, we have completed a subsurface investigation and evalution for the above referenced project. It is our pleasure to transmit herewith three (3) copies of our report.

SITE LOCATION:

This site is located north of Columbia City, Indiana. Specifically, this site may be located using the Merriam, Indiana, 7½ minute quadrangle map in the northeast quarter of Section 3, Township 32 North, Range 9 East.

The purpose of this subsurface investigation was to determine the various soils profile components, determine the engineering characteristics of the materials encountered, and provide information to be used in evaluating the stability of the dam.

The field investigation included reconnaissance of the project site, making three (3) soil borings, performing standard penetration tests, and obtaining soil samples retained in the standard split-spoon sampler. Also, undisturbed soil samples were obtained from shelby tubes pushed at each boring location at various depths. The apparent groundwater levels at the boring locations were also determined.

A boring location plan was not available at the time of this report. The borings were located on-site by one of your representative. Boring B-1 and B-2 were drilled at the northern and southern abutments, respectively. Boring B-3 was drilled midway between these two (2) borings.

The soil borings were performed with a conventional drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes. Representative samples were obtained employing split-spoon sampling procedures in accordance with ASTM Procedure D-1586.

During the sampling procedure, standard penetration tests were performed at regular intervals to obtain the standard penetration value of the soil. The standard penetration value is defined as the number of blows of a 140-pound hammer, falling thirty (30) inches, required to advance the split-spoon sampler one (1) foot into the soil. The results of the standard penetration tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

The types of soils encountered in the borings were visually classified according to the Unified Soil Classifiction System and are described in detail on the boring logs. Representative samples of the soils encountered in the field were placed in sample jars and are now stored in our laboratory. Unless notified to the contrary, all samples will be disposed of after three (3) months.

The laboratory testing program included supplementary visual classification on all samples. Moisture content tests, atterberg limit tests, grain size analyses, and unit weight tests were performed on representative soil samples. All test results are presented in the appendix of this report.

All three (3) borings indicate that the dam is composed of one (1) predominate soil type. The upper stratum covering the dam is a cohesive sandy lean clay and was used as fill in order to construct the dam structure. This soft to medium stiff material was encountered from the ground surface to depths ranging from seven (7) to ten (10) feet. This soft shallow material is underlain by a hard sandy lean clay to approximate depths of twelve (12) to fourteen and one-half (14½) feet below existing grade. Beneath this cohesive stratum, a gray wet sand with silt was encountered to the termination depth of our borings (sixteen (16) feet).

Slope Stability

Laboratory tests performed on representative cohesive soil samples indicated that the upper seven (7) to nine (9) feet of the dam has not been compacted in-place. Typically, construction practice for earth dams dictate the upstream slope and downstream slope to be on a 3:1 (horizontal to vertical) slope or shallower. In this case, both slopes are slightly steeper than a 2:1 slope. Furthermore, based on the in-place soil densities, the existing dam is not agreeable with safe engineering and construction practice for earth dams.

Our reconnaissance of the site did not indicate any existing failures, slope stability problems or obvious seepage problems. It should be noted, however, that the downstream slope was heavily vegetated at the time and a visual inspection was extremely difficult.

Seepage Control

Our test borings indicated that the dam is composed of a very soft layer of cohesive soils to an approximate depth of nine (9) feet. Thus, it is anticipated that some seepage is taking place at the fill/natural soil interface within this dam. If the dam is reconstructed and in order to avoid damage to the dam, it is recommended that a toe drain and an erosion protection system be installed. This toe drain will prevent water from softening the cohesive soils and minimize water at the base of the dam.

Downstream Slope Protection

The downstream slope of this homogeneous embankment must be protected against erosion by wind and rainfall runoff by a layer of rock, cobbles, or seeding. The slope currently is overgrown with brush and should be cleaned up in order to achieve an adequate vegetation cover.

Upstream Slope Protection

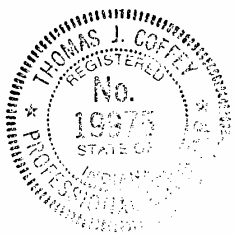
It is also recommended that an adequate slope protection be provided for the earth embankment against wind and wave erosion, weathering, and ice damage. The type of protection provided will be governed by the available materials and the economic applicability. Dumped riprap is the most preferred type of upstream slope protection and should be placed on the upstream face of the slope from approximately five (5) feet below normal low pool level to the crest of the embankment. The nominal thickness of riprap for the main embankment of a dam of this type is twelve (12) inches of riprap. A bedding layer of gravel or crushed rock should be provided underneath the riprap.

It should be noted that this subsurface investigation is a preliminary evaluation of the dam foundation conditions. Considerations for a cut-off trench, jet grouted curtain cut-off, thickness of the underlying sand layer, slope stability and/or spillway conditions were not evaluated at this time. Once the Indiana Department of Natural Resources reviews this preliminary report and based on their comments, additional field and laboratory tests may be performed to supplement the results of our preliminary investigation.

Often, because of design and construction details which occur on a project, questions rise concerning the soil conditions. If we can give further service in these matters, please contact us at your convenience.

Very truly yours,

ALT & WITZIG ENGINEERING, INC.



Eric Felix,
Project Engineer

Thomas J. Coffey, P.E.

EF:TJC/kdc

APPENDIX D

APPENDIX D

SLOPE STABILITY DESIGN CALCULATIONS

The actual shear stress, as determined by maximum flow depth and channel slope, was determined to be 0.56 psf . Therefore, the permissible shear stress of SC150 is greater than the actual shear stress of the stream indicating that the selected blanket will provide adequate protection while vegetation is established. Once the vegetation is established, the maximum permissible shear stress of the streambank will increase.

APPENDIX E

APPENDIX E

DAILY INSPECTION REPORT

Environmental Engineers/Biologists/Planners/Consultants
Walkerton/Indianapolis, Indiana

PG.___ OF ___

REPORT NO. ___

PROJECT NAME: _____

PROJECT NO. _____ DAY: _____ DATE: _____
DAYS ALLOWED: ____ DAYS REMAINING: ____ TEMP; MAX: ___(F°), MIN: ___(F°)

WEATHER CONDITIONS: _____

CONTROLLING OPERATION: _____

WORK PERFORMED BY CONTRACTOR:

CONTRACTOR'S MANPOWER AT SITE:

CONTRACTOR'S EQUIPMENT AT SITE:

VISITORS TO SITE:

SIGNATURE: _____
Inspector

APPENDIX F

APPENDIX F

CONSTRUCTED WETLANDS MONITORING FORM

CROOKED LAKE

Volunteer's Name:_____

Site:_____

Date:_____

Time:_____

Air Temp:_____

Weather: ___Sunny ___Partly Cloudy ___Overcast ___Rain

Wind: ___0-5 mph ___5-10 mph ___10-15 mph ___15+ mph

Wind Direction:_____

Structural Integrity

Evidence of Human Activity:_____
_____
_____

Evidence of Animal Activity:_____
_____
_____

Evidence of Erosion:_____
_____
_____

Damage to Stop Logs:_____
_____
_____

Assessment of Vegetation

Wetland Plants:	Type	Number

Herbaceous Cover:	Type	Number

Shrubs:	Type	Number

Trees:	Type	Number

Depth of Silt

Sedimentation Basin:_____

Barkey Pond:_____

Chemical Testing (To be filled in after receipt of test results)

Total Phosphorus (TP):_____

Total Suspended Solids (TSS):_____

APPENDIX G

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

June 24, 1996

Operations Division
Regulatory Branch (North)
ID No. 199600796-pjl

Mr. John B. Richardson
J. F. New & Associates, Inc.
P.O. Box 243
Walkerton, Indiana 46574

Dear Mr. Richardson:

This is in response to your request on behalf of the Crooked Lake Association for authorization to place fill for bank protection and sedimentation controls in Farm Ditch and Barkey Pond, in Whitley County, Indiana. The information supplied by you was reviewed to determine whether a Department of the Army (DA) permit will be required under the provisions of Section 404 of the Clean Water Act.

Your project is considered a discharge of fill material into a headwaters or isolated waters. Since less than 1 acre of "waters of the United States" would be impacted by this discharge and the work site is in a headwaters area, the project is authorized under the provisions of Nationwide General Permit 33 CFR 330 Appendix A, Part B(26), Headwaters and Isolated Waters. Under the provisions of this authorization you must comply with the enclosed Terms for Nationwide Permit No. 26 and the Nationwide Permit Conditions. You must also obtain individual Water Quality Certification (WQC) from the Indiana Department of Environmental Management (IDEM).

If IDEM fails to respond to your May 10, 1996, request for authorization within 60 calendar days, the WQC is considered waived. The responsibility for obtaining the state WQC rests with you.

Once you obtain your certification or waiver you may proceed with construction without further contact or verification from us. This decision is valid for 2 years from the date of this letter. If your project is not completed within this 2-year period or if your project is modified, you must contact us for another permit determination. A copy of this letter is being sent to the applicant and to the IDEM.

DIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

vision of Water
)2 W. Washington St., Rm. W264
dianapolis, Indiana 46204-2748
17-232-4160
AX: 317-233-4579

June 4, 1996

J.F. New & Associates, Inc.
Attn. John Richardson
708 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Re: Gabion Drop Structures
on Inlet Ditch near Crooked
Lake in Whitley County

Dear Mr. Richardson:

Thank you for your letter dated March 25, 1996, concerning whether or not a permit would need to be obtained to install two gabion drop structures on Farm Ditch near Little Crooked Lake in Whitley County.

The "Ditch" Act, IC 14-26-5, charges the Indiana Department of Natural Resources with regulating all construction which occurs within any ditch or drain having a bottom depth lower than the normal water level of a freshwater lake of ten [10] acres or more and within one-half [1/2] mile of the lake. After reviewing the profile views received by the Division of Water on April 9, 1996 and April 12, 1996, it has been determined that the project is located above the legally established elevation of 905.69 feet, M.S.L. of Little Crooked Lake. Therefore, this project is not within the jurisdictional authority of the "Ditch" Act, IC 14-26-5, and a permit need not be obtained.

The Flood Control Act, IC 14-28-1, prohibits constructing abodes or residences in or on a floodway and requires the prior written approval of the Department of Natural Resources for any other type of construction, excavation or filling in or on a floodway. After reviewing the profile views received by the Division of Water on April 9, 1996 and April 12, 1996, it has been determined that this project is not within the jurisdictional authority of the Flood Control Act, IC 14-28-1, and a permit need not be obtained.

Please be aware that you may have to obtain a permit from the U.S. Army Corps of Engineers under Section 404 of the Federal Water Pollution Control Act or Section 10 of the Rivers and Harbors Act. For information on the Corps permit requirements, it is recommended you contact the U.S. Army Corps of Engineers Louisville District Office at (502) 582-5607.

If you have any further questions concerning this matter, please contact Mr. Anthony Foreman, Lake Inspector, Lake Permits Section at (317) 232-5661.

Sincerely,

original signed

Michael W. Neyer, P.E.
Assistant Director
Division of Water

MWN/adf

DIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

ivision of Historic Preservation
and Archaeology
)2 W. Washington St., Rm. 274
dianapolis, Indiana 46204
17-232-1646

June 21, 1996

John B. Richardson, Wetland Ecologist
J.F. New & Associates, Inc.
708 Roosevelt Road
P.O. Box 243
Walkerton, Indiana 46574

Dear Mr. Richardson:

We have reviewed the proposed excavation and the placement of fill at Farm Ditch near Columbia City in Whitley County, Indiana.

As long as no structures will be demolished or removed and the fill is obtained from a previously disturbed location, no known historical, architectural or archaeological sites listed in or eligible for inclusion in the National Register of Historic Places will be affected by this project. If any archaeological artifacts are uncovered during construction, federal law and regulations (16 USC 470, et seq.; 36 CFR 800.11, et al.) and, additionally, state law (Indiana Code 14-21-1), require that work must stop and that the discovery must be reported to the Division of Historic Preservation and Archaeology within two (2) business days.

We appreciate the opportunity to be of service.

Very truly yours,

Daniel J. Fogerty

Patrick R. Ralston
State Historic Preservation Officer

PRR:SBH:MMD:smg

If you have any questions, please contact me by writing to the above address, ATTN: CEORL-OP-FN, or by calling (502) 582-5607. Any correspondence on this matter should refer to our ID No. 199600796-pjl.

Sincerely,

Pam Loeffler
Regulatory Specialist
Regulatory Branch

Enclosures

TERMS FOR NATIONWIDE PERMIT NO. 26

Headwaters and Isolated Waters Discharges. Discharges of dredged or fill material into headwaters and isolated waters provided:

a. The discharge does not cause the loss of more than 10 acres of waters of the United States;

b. The permittee notifies the district engineer if the discharge would cause the loss of waters of the United States greater than one acre in accordance with the "Notification" general condition. For discharges in special aquatic sites, including wetlands, the notification must also include a delineation of affected special aquatic sites, including wetlands. (Also see 33 CFR 330.1(e)); and

c. The discharge, including all attendant features, both temporary and permanent, is part of a single and complete project.

For the purposes of this nationwide permit, the acreage of loss of waters of the United States includes the filled area plus waters of the United States that are adversely affected by flooding, excavation or drainage as a result of the project. The ten-acre and one-acre limits of NWP 26 are absolute, and cannot be increased by any mitigation plan offered by the applicant or required by the DE. Subdivisions: For any real estate subdivision created or subdivided after October 5, 1984, a notification pursuant to subsection (b) of this nationwide permit is required for any discharge which would cause the aggregate total loss of waters of the United States for the entire subdivision to exceed one (1) acre. Any discharge in any real estate subdivision which would cause the aggregate total loss of waters of the United States in the subdivision to exceed ten (10) acres is not authorized by this nationwide permit; unless the DE exempts a particular subdivision or parcel by making a written determination that: (1) the individual and cumulative adverse environmental effects would be minimal and the property owner had, after October 5, 1984, but prior to January 21, 1992, committed substantial resources in reliance on NWP 26 with regard to a subdivision, in circumstances where it would be inequitable to frustrate his investment-backed expectations, or (2) that the individual and cumulative adverse environmental effects would be minimal, high quality wetlands would not be adversely affected, and there would be an overall benefit to the aquatic environment. Once the exemption is established for a subdivision, subsequent lot development by individual property owners may proceed using NWP 26. For purposes of NWP 26, the term "real estate subdivision" shall be interpreted to include circumstances where a landowner or developer divides a tract of land into smaller parcels for the purpose of selling, conveying, transferring, leasing, or developing said parcels. This would include the entire area of a residential, commercial or other real estate subdivision, including all parcels and parts thereof. (Section 404)

Nationwide Permit Conditions
(Section 10 and Section 404)

General Conditions: The following general conditions must be followed in order for any authorization by a nationwide permit to be valid:

1. *Navigation.* No activity may cause more than a minimal adverse effect on navigation.

2. *Proper maintenance.* Any structure or fill authorized shall be properly maintained, including maintenance to ensure public safety.

3. *Erosion and siltation controls.* Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills must be permanently stabilized at the earliest practicable date.

4. *Aquatic life movements.* No activity may substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's primary purpose is to impound water.

5. *Equipment.* Heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.

6. *Regional and case-by-case conditions.* The activity must comply with any regional conditions which may have been added by the division engineer (see 33 CFR 330.4(e)) and any case specific conditions added by the Corps.

7. *Wild and Scenic Rivers.* No activity may occur in a component of the National Wild and Scenic River System; or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status. Information on Wild and Scenic Rivers may be obtained from the National Park Service and the U.S. Forest Service.

8. *Tribal rights.* No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

9. *Water quality certification.* In certain states, an individual state water quality certification must be obtained or waived (see 33 CFR 330.4(c)).

10. *Endangered Species.* No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which is likely to destroy or adversely modify the critical habitat of such species. Non-federal permittees shall notify the district engineer if any listed species or critical habitat might be affected or is in the vicinity of the project and shall not begin work on the activity until notified by the district engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized. Information on the location of threatened and endangered species and their critical habitat can be obtained from the U.S. Fish and Wildlife Service and National Marine Fisheries Service. (see 33 CFR 330.4(f))

11. *Historic properties.* No activity which may affect Historic properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the DE has complied with the provisions of 33 CFR 325, Appendix C. The prospective permittee must notify the district engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places (see 33 CFR 330.4(g)).

Nationwide Permit Conditions
(Section 404 Only)

In addition to the General Conditions, the following conditions apply only to activities that involve the discharge of dredged or fill material and must be followed in order for authorization by the nationwide permits to be valid:

1. *Water supply intakes.* No discharge of dredged or fill material may occur in the proximity of a public water supply intake except where the discharge is for repair of the public water supply intake structures or adjacent bank stabilization.

2. *Shellfish production.* No discharge of dredged or fill material may occur in areas of concentrated shellfish production, unless the discharge is directly related to a shellfish harvesting activity authorized by nationwide permit 4.

3. *Suitable material.* No discharge of dredged or fill material may consist of unsuitable material (e.g., trash, debris, car bodies, etc.) and material discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

4. *Mitigation.* Discharges of dredged or fill material into waters of the United States must be minimized or avoided to the maximum extent practicable at the project site (i.e. on-site), unless the DE has approved a compensation mitigation plan for the specific regulated activity.

5. *Spawning areas.* Discharges in spawning areas during spawning seasons must be avoided to the maximum extent practicable.

6. *Obstruction of high flows.* To the maximum extent practicable, discharges must not permanently restrict or impede the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

7. *Adverse impacts from impoundments.* If the discharge creates an impoundment of water, adverse impacts on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow shall be minimized to the maximum extent practicable.

8. *Waterfowl breeding areas.* Discharges into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

9. *Removal of temporary fills.* Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We make Indiana a cleaner, healthier place to live

Evan Bayh
Governor
Kathy Prosser
Commissioner

100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015
Telephone 317-232-8603
Environmental Helpline 1-800-451-6027

May 22, 1996

VIA CERTIFIED MAIL P 579 451 184

Mr. John B. Richardson
J.F. New & Associates, Inc.
708 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574

Dear Mr. Richardson:

Re: Section 401 Water Quality Certification
Project: Farm Ditch
Applicant: Crooked Lake Association
Whitley County

Office of Water Management staff have reviewed your correspondence dated May 10, 1996, requesting Section 401 Water Quality Certification to excavate and fill below the ordinary high water mark of Farm Ditch. The purpose of the proposed Lake and River Enhancement Project is to improve the water quality of the flow to the lake. In addition to pulling back the side slopes of approximately 400 feet of ditch from 1:1 to 2:1 slopes, the project will require the discharge of approximately 95 cubic yards of clean fill material.

Based on the available information, it is the judgment of this office that the proposed project will not cause a significant impact to water quality provided that conditions set forth by the State are incorporated into the project. Therefore, subject to the following conditions, the Indiana Department of Environmental Management (IDEM) hereby grants Section 401 Water Quality Certification:

1. The project will be consistent with the plans attached to the May 10, 1996, correspondence.

2. The spoils from the excavation will be placed on upland only.

3. The contractor performing the actual operations must comply with Section 311 of the Federal Clean Water Act and with 327 IAC 2-6 (formerly Indiana Stream Pollution Control Board Regulation 330 IAC 1-6-1) concerning

spills of oil and hazardous materials.

4. Deposition of dredged or excavated materials and all earthwork operations will be carried out in such a manner that soil erosion and sediment runoff to any nearby watercourse are controlled and minimized. The use of straw bale barriers, silt fencing, or an earthen berm around disturbed areas is recommended to prevent soil from leaving the construction site. Information and assistance regarding control of construction-related soil erosion are available from the Soil and Water Conservation District (SWCD) offices, collocated with the local field office of the USDA Natural Resources' Conservation Service (NRCS) in each county, and the regional field offices of the Indiana Department of Natural Resources' Division of Soil Conservation, whose administrative office is at 402 W. Washington Street, Room W264, Indianapolis, IN 46204. Areas used for deposition of dredged materials should be provided with temporary dikes or bulkheads for separation and retention of solids. Vegetative cover should be established on dredged or excavated material as soon as possible.

This certification is effective 18 days from the mailing of this notice unless a petition for review and a petition for stay of effectiveness are filed within this 18 day period. If a petition for review and a petition for stay of effectiveness are filed within this period, any part of the permit within the scope of the petition for stay is stayed for 15 days, unless or until an Environmental Law Judge further stays the permit in whole or in part.

This decision may be appealed in accordance with IC 4-21.5, the Administrative Orders and Procedures Act. The steps that must be followed to qualify for review are:

1. You must petition for review in a writing that states facts demonstrating that you are either the person to whom this decision is directed, a person who is aggrieved or adversely affected by the decision, or a person entitled to review under any law.

2. You must file the petition for review with the Office of Environmental Adjudication (OEA) at the following address:

   Office of Environmental Adjudication
   ISTA Building
   150 West Market Street
   Suite 618
   Indianapolis, IN 46204

3. You must file the petition within eighteen (18) days of

the mailing date of this decision. If the eighteenth day falls on a Saturday, Sunday, legal holiday, or other day that the OEA offices are closed during regular business hours, you may file the petition the next day that the OEA offices are open during regular business hours. The petition is deemed filed on the earliest of the following dates: the date it is personally delivered to the OEA, the date that the envelope containing the petition is postmarked if it is mailed by United States mail, or the date it is shown to have been deposited with a private carrier on the private carrier's receipt, if sent by private carrier.

Identifying the permit, decision, or other order for which you seek review by permit number, name of the applicant, location, or date of this notice will expedite review of the petition.

Note that if a petition for review is granted pursuant to IC 4-21.5-3-7, the petitioner will, and any other person may, obtain notice of any prehearing conferences, preliminary hearings, hearings, stays, and any orders disposing of the proceedings by requesting copies of such notices from the OEA.

Granting of Section 401 Water Quality Certification does not relieve the applicant from the responsibility of obtaining any other permits or authorizations that may be required for this project or related activities from IDEM or any other agency or person.

If you have any questions about this certification, contact Mr. Brett Crump, Project Manager, of my staff at 317/233-2475, or you may contact the Office of Water Management through the IDEM Environmental Helpline (1-800-451-6027).

If you have procedural questions regarding filing a petition for review you may contact the OEA at 317-232-8591.

Sincerely,

R. J Henley

R. J Henley
Assistant Commissioner
Office of Water Management

cc: Colonel Ralph Grieco
U.S. Army Corps of Engineers
Louisville District